

REMARKS

The foregoing amendment amends Claims 4 and 7 to clarify the claimed invention. Claims 4, 7, 20 and 21 are currently pending in this application. For the reasons set forth below, Applicant believes that the rejections should be withdrawn and that Claims 4, 7, 20 and 21 are in condition for allowance.

REJECTION OF CLAIMS 4, 7, 20 AND 21 UNDER 35 U.S.C. 103(a)

The Examiner rejected Claims 4, 7, 20 and 21 under 35 U.S.C. 103(a) as being unpatentable over U.S. Patent No. 5,532,585 to Oudet *et al.* (“Oudet”) in view of U.S. Patent No. 6,559,637 to Miyata *et al.* (“Miyata”). As discussed below, this rejection is respectfully traversed.

Claims 4 and 7

Claims 4 and 7 have been amended to clarify the structure of the non-contact position sensor. More specifically, amended Claim 4 clarifies that the assist stator has a second pair of opposed walls corresponding to front and back faces of the part of the magnet that does not enter the area and transverse walls extending from the second pair of opposed walls which are separated from each other through a second gap formed between the transverse walls, *wherein the first and second gaps are formed uniformly along a moving direction of the slider, respectively. (emphasis added)*. Amended Claim 7 clarifies that the non-contact position sensor includes an assist stator consisting of a magnetic body having a second pair of opposed walls forming a second area which allows the slider to move while keeping a predetermined clearance and transverse walls extending from the second pair of opposed walls which are separated from each other through a second gap formed between the transverse walls, wherein there is a third gap between the assist stator and the main stator, and a magnetically-sensitive sensor arranged in the first gap to detect a position of the slider corresponding to a percentage of the magnet entering the first area, *wherein the first and third gaps are formed uniformly along a moving direction of the slider respectively. (emphasis added)*.

The present application discloses a non-contact position sensor that uses a stator as a magnetic path for magnetic flux generated by a magnet in the stator. The stator prevents leakage of the magnetic flux. (See e.g., pg. 12, ll. 7-14). The flux generated from the part of the magnet that does not enter the main stator enters the assist stator and thus does not leak into the main stator. By preventing the flux that is generated from the part of the magnet that does not enter the main stator from leaking into the main stator, there is no effect on linearity and hysteresis in the detection of flux by the hall sensor. (See Fig. 3(b) and pg. 14, ll 18-24.) In addition, because the assist stator is provided with a gap Ga, any offset of the magnet in a direction perpendicular (e.g. X-direction or Y-direction) to a moving direction of the magnet (e.g. Z-direction) would not influence the magnetic paths, thereby causing no change in detection outputs of the sensor. (See pg. 12, ll. 15-19).

The Examiner acknowledged that Oudet fails to disclose an assist stator for preventing magnetic flux, which is generated in a part of the magnet that does not enter the area, from leaking out to the main stator, wherein the assist stator has a second pair of opposed walls corresponding to front and back faces of the part of the magnet that does not enter the area and transverse walls extending from the second pair of opposed walls which are separated from each other through a second gap formed between the transverse walls, as required by Claim 4. The Examiner also acknowledged that Oudet fails to disclose an assist stator consisting of a magnetic body having a second pair of opposed walls forming a second area which allows the slider to move while keeping a predetermined clearance and transverse walls extending from the second pair of opposed walls which are separated from each other through a second gap formed between the transverse walls, wherein there is a third gap between the assist stator and the main stator, as required by Claim 7. The Examiner relied on Miyata for disclosing the claimed structures.

Miyata discloses a non-contact rotational position sensor. As illustrated in Figure 2 of Miyata, the rotation of the magnet 10 causes a change in the area of a stator 11, 12, 13, 14 where the north pole is positioned and the area of the stator where the south pole is positioned so that the quantity of magnetic flux (i.e., a redundant magnetic flux) remaining after the cancellation of the magnetic flux from the north pole and the magnetic flux from the

south pole is changed. The position sensor 100 detects the rotational angle of the magnet 10 by sensing a change in the quantity of the redundant magnetic flux in the stators 11, 12, 13, 14. A magnetic flux generated by the magnet 10 is converged to the two air gaps G2. (See col. 4, ll. 46-52).

Oudet discloses a non-contact linear position sensor. The Office Action does not describe how a linear position sensor could be combined with a rotational position sensor. Unlike the rotational position sensor, it is very difficult for the area of the stator 12 where the north pole of the magnet 3 is located and the area of the stator 12 where the south pole of the magnet is located to change. Thus, applying the magnet 10 of Miyata to the linear position sensor 1 of Oudet would make it quite difficult to detect a position with high-precision because of the lack of change in area.

Neither Oudet nor Miyata disclose or suggest a non-contact position sensor wherein the first and second gaps are formed uniformly along a moving direction of the slider, as required by Claim 4, nor the first and third gaps are formed uniformly along a moving direction of the slider, as recited by 7. None of the figures or corresponding sections of Oudet or Miyata show otherwise.

Furthermore, there is no reason to combine Oudet and Miyata as alleged by the Examiner. As described above, Oudet teaches a linear position sensor, whereas Miyata details a rotational position sensor. The Office Action does not describe how the structure of the rotational position sensor illustrated by Miyata would be combined within the linear position sensor of Oudet or how such a combination would further aid in preventing magnetic flux. Oudet in combination with Miyata does not teach nor render obvious all features or elements of Claims 4 and 7. Accordingly, Claims 4 and 7 are patentable over Oudet in view of Miyata.

CLAIMS 20 and 21

Claim 20 depends from Claim 4, and Claim 21 depends from Claim 7. Accordingly, for at least the same reasons discussed above, Claims 20 and 21 are patentable over Oudet in view of Miyata.

CONCLUSION

The foregoing is submitted as a complete response to the Office Action identified above. This application should now be in condition for allowance, and Applicant solicits a notice to that effect. The Commissioner is authorized to charge any additional fees that may be due or credit any overpayment to Deposit Account No. 11-0855. If there are any issues that can be addressed via telephone, the Examiner is asked to contact the undersigned at 404.685.6799.

Respectfully submitted,
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